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## Research on Evaluation System of Vocational Capacity of Financial Engineering Specialty

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### Abstract

The paper starts from questionnaire survey of enterprises' capacity and quality requirement for graduates of financial engineering specialty and then establishes a capacity evaluation system and model for application-oriented talents majoring financial engineering based on questionnaire survey, with analysis results of capacity requirements of enterprises and suggestions from educational specialists and experts from human resources department taken into consideration; a questionnaire survey of capacity and quality of financial engineering graduates based on capacity evaluation index system is further designed and carried out. The findings will be used to measure their capacity and quality in integration of grades of all courses in college so as to provide guidance for reform of educational mode.

**Key words:** Financial engineering; Vocational capacity; Evaluation

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### INTRODUCTION

In recent years, colleges and universities of China have set up financial engineering specialty and many scholars have done lots of research on curriculum design, educational objectives and mode, etc.. However, American educational model has strong differences from the cultivation of financial engineering talents of China which mainly focus on undergraduate students, it is inappropriate to follow suit directly. Meanwhile, the financial engineering specialty started just at the transition period from elite education to popularized education. It is urgent for higher education, especially ordinary universities to reform the thought and theory of schooling, construction of curriculum system and teaching staff, teaching management and operation mechanism. Moreover, colleges and universities offering financial engineering specialty are generally economic colleges and universities, which don't enjoy the same advantages as the engineering college and universities, particularly, the students in ordinary universities are lacking in mathematics and theoretical foundation. Therefore, it is highly integrated to construct curriculum system based on requirements and applied capacity and educational objectives and different colleges and universities have done their respective exploration.

Financial engineering is a new specialty. At present, the cultivation of the specialty mainly focused on the theory of mathematical and statistical training, such as Columbia University, Princeton University, University of Chicago, etc., which's object are cultivate the financial engineering master, these University's model focuses on the theoretical research, and the requirements of mathematics achievement is very high. It's difficult to finish the courses, alternatively, the other model is called business school model. The model is more emphasis on the practice, the requirements of theoretical analysis are low. In recent years, China's colleges and universities began to open the financial engineering specialty. But

the specialty is opened in the undergraduate stage in our country universities. For this, it is different between our country universities and the United States'; the United States' models are not suitable for us. At the same time, our country's financial engineering specialty is during the transition period from "elite education" to "popular education". In colleges and universities, the reform of educational ideas, curriculum system, teachers, teaching management and teaching operation mechanism are imminent, and in the our country new specialty is opened in economic institution. The students in these colleges and universities have weak base of Engineering and mathematics. Therefore, for the colleges and universities, the curriculum system should be constructed to apply for the goal of the ability. Different colleges and universities also have their own exploration. But, the curriculum system of financial engineering is not mature now, it is important how to set up the target, and how to set up the curriculum system based on real needs and training objectives.

This paper is aimed at the construction of the current financial engineering professional evaluation system, in order to provide a theoretical reference for the design and construction of the curriculum system for financial engineering. Because of our country's financial engineering is new specialty, it is influenced by the academic education for a long time, and it is not conducive to the sustainable development of this profession, and it is not conducive to meet the needs of the society. The effective professional talent evaluation system of financial engineering should be established scientifically, which will highlight the characteristics of the application ability, and reflect the demand of different curriculum system. And the effective and scientific professional talent evaluation system can improve the students' competency for the future job and meet the society demand of financial engineering professionals,

In general, the construction of curriculum system of financial engineering specialty is still immature. Since the consensus has been reached that ordinary universities aim to cultivate application-oriented talents, it has been the key for teaching reform of financial engineering specialty to set up a complete cultivation mechanism targeted at application-oriented talents and the evaluation of students' professional capacity is crucial for establishment of complete cultivation mechanism.

## **1. CONSTRUCTION OF CAPACITY EVALUATION SYSTEM AND MODEL**

### **1.1 Survey of Enterprise Requirements**

In order to understand the exact requirements of the financial industry for information quality, the research team conducted questionnaire survey of requirements of professional capacity and students' capacity at the beginning of research, with reference to relative academic

literature and cultivation of colleges and universities. There are altogether 16 questions about professional requirements and students' capacity. Questionnaires have been distributed to 100 companies and enterprises, in which 92 valid questionnaires collected; 300 questionnaires offered to students, 289 valid collected, thus meeting the requirement of analysis. The research team has further understood the tendency of industrial requirement though questionnaire survey.

It can tell from statistic analysis of enterprises' quality requirements that they pay attention to capacity of absorbing and learning professional knowledge, capacity of marketing expansion, cooperative capacity, strong sense of responsibility, pressure relief, endurance of difficulties and frustrations; while care little about the level of theory and policy, capacity of innovation and development and judgment. These are in turn connected with the expectation of new employees. The newly-recruited employees of financial engineering specialty are more involved in some basic work, with relatively less decision-making work such as planning and designing, which will have impact on the findings of questionnaire.

Enterprises have different statistical results on graduates' vocational capacity feedback, which turns out to be definite and intensive. For instance, the undergraduate graduates haven't got sufficient basic skills and practical capacity. The graduates have two problems in the work: They aim high, while don't focus on their duties; they can't work hard or endure hardships, lacking in steadiness and diligence.

### **1.2 Evaluation Index of Students' Capacity and Quality**

The comments from enterprises' feedback of information quality and training of financial engineering graduates are relatively definite and intensive, such as the graduates have poor ability to acquire process and distinguish information. In order to avoid subjectivity and one-sidedness, the paper selects a set of index for core capacity of application-oriented talents as follows by following experts' suggestions extensively, integrating evaluation criteria of modern human resources and comments from enterprises being investigated, with reference to relative theoretical research results.

a) A mastery of basic theory of financial engineering, a thorough understanding of basic knowledge of courses relevant with financial engineering specialty, such as finance, accounting, management and science of law, with reasonable knowledge structure.

b) Strong capacity of financial analysis and innovation, including designing simple finance through existing financial products (or securities).

c) Capacity of mathematical modeling and empirical investigation of the financial market, including simulation of security trade, operational guidelines for investment management, etc..

d) Relatively good capacity of constructing framework of theoretical knowledge of mathematics with integration of relative knowledge about finance, including scientific research methods and technique with the integration of qualitative and quantitative analysis.

e) Strong sense of comprehension, including comprehending concepts in the financial engineering, financial informationization, the importance of risk management for operation of financial institutions.

f) Strong capacity of transaction and application, including transaction of banking service (such as savings business, public business and bill business) and application of the financial informationization system.

g) Strong capacity of communication through English and acquisition and processing of text in foreign languages.

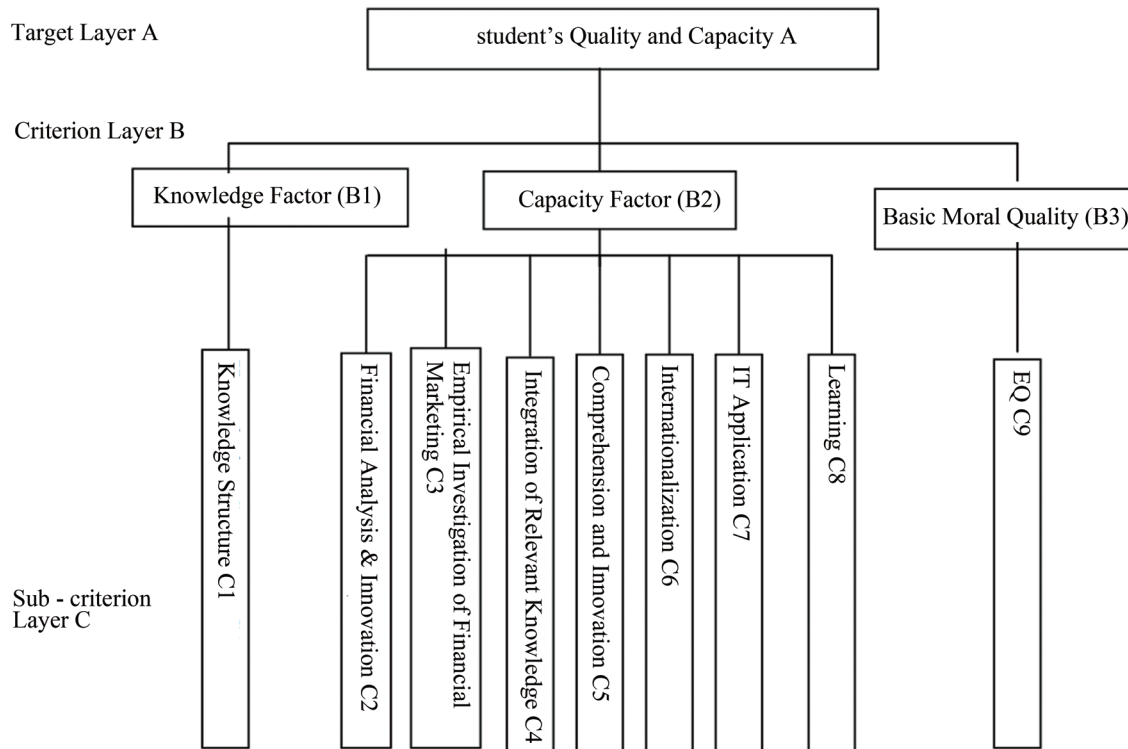
g) Strong capacity of computer operation and capacity of acquiring and processing information.

h) EQ (Emotional Quotation)

In which there is application capacity and key capacity, with knowledge factor presented in index 1, capacity factor presented from 2 to 8.

### 1.3 Establishment of Hierarchical Structure for Student's Evaluation

There are mainly three criteria for comprehensive evaluation of students' quality and capacity, i.e. knowledge factor, capacity factor and basic moral quality. Each criteria will be further divided into several sub-criteria in different layers of A, B, C,... from top to bottom and different factors represented by 1, 2, 3, 4... from left to right on the same layer, as is shown in Figure 1.



**Figure 1**  
**Schematic Structure of Capacity Layers**

After experts' comment, the judgment matrix of capacity and quality factors is modified as follows:

**Table 1**  
**Judgment Matrix of Capacity and Quality Factors**

A	B1	B2	B3	B1	C1	B2	C2	C3	C4	C5	C6	C7	C8	B3	C9
B1	1	1	2	C1	1	C2	1	1	1/2	1/2	1	1	1	C9	1
B2		1	2			C3		1	1/2	1/2	1	1	1		
B3			1			C4			1	1	2	2	2		
						C5				1	2	2	2		
						C6					1	1	1		
						C7						1	1		
						C8							1		

Consistency check will be carried out for judgment matrix in hierarchy ranking, with the results shown in Table 2.

**Table 2**  
**Weight Vector of Hierarchical Calculation of Capacity and Quality Factors and the Checking Results**

A Single (total) ranking weight	B1 Single ranking weight	B2 Single ranking weight	B3 Single ranking weight
B1 0.25	C1 1	C2 0.1667	C9 1
B2 0.25	CR 0	C3 0.1667	CR 0
B3 0.5		C4 0.0833	
CR 0		C5 0.0833	
		C6 0.1667	
		C7 0.1667	
		C8 0.1667	
		CR 0.010	

It can tell that CR of all the single ranking is  $<0.1$  with acceptable consistency of the matrix. Meanwhile, consistency check should be carried out for total ranking, with the results shown as follows:

**Table 3**  
**Total Ranking of Layer C (CR = 0.0000)**

C1	C2	C3	C4	C5	C6	C7	C8	C9
0.25	0.0417	0.0417	0.0208	0.0208	0.0417	0.0417	0.0417	0.5

The overall consistency of judgment matrix is acceptable since CR of total ranking is also less than 0.1.

## 2. QUESTIONNAIRE SURVEY AND EVALUATION OF GRADUATES' QUALITY AND CAPACITY

There are two types of questionnaire targeted at students: one for graduates to confirm evaluation of enterprises for requirement investigation and students' quality; the other for undergraduate students, covering students' quality, organization, learning capacity, investigation of undergraduates' capacity and quality to clarify orientation of education and cultivation.

### 2.1 Statistical Analysis of Questionnaire Survey of Students' Capacity and Quality

190 questionnaires for graduates were distributed under various limitations, with 181 copies collected. All the questionnaires are summarized and statistically analyzed as follows:

a) Complete and reasonable knowledge structure. Complete and reasonable knowledge structure is presented in professional knowledge with integration of humanities and science. Relevant questions targeted at knowledge of humanities and science have been designed, with the integration of the students' grades as well.

b) Financial analysis and innovation. Professional analysis evaluation mainly studies the students' completion of basic services, with in-campus internship and graduation paper taken into consideration. The

selection of survey content mainly focuses on avoidance of differences in specific positions since different positions will have different requirements for professional skills.

c) Empirical investigation of finance. It will be surveyed through three questions in the questionnaire, which check the students' practical transaction capacity in real securities trade or investment analysis.

d) Integration and association of relevant knowledge. It highlights whether students can put theory into practice. It not only reflects the integration of math and finance, but also practical problems and association of relevant knowledge.

e) Comprehensive capacity. It is about comprehensive capacity of professional knowledge, understanding of information systemization and whether risk management is related with effective solution of problems in operation of financial institutions.

f) Processing and application. It includes induction and sorting of numerous knowledge, in which students will select and process useful information, have sensitivity to data and proficiency of service, etc..

g) Application of information technology. Computer results and application of computers in the job will be integrated into the survey of internalization, which is relatively poor in capacity evaluation.

h) English learning and communication. Based on English results, application of English in job and understanding of international norms, internalization is relatively poor in capacity evaluation.

There are three types of markers for the table in the results analysis: Positive, neutral and negative, which will be assigned as 1, 0 and -1 respectively. Similarly, the

results of in-campus English, computer and professional courses, results of internship and graduation paper will be marked by the three grades as well. The results of English, computer and professional courses will be put into three grades from 60 to 80; the results of internship

and graduation paper will be marked by positive (excellent and good), neutral (medium) and negative (pass). Each index under the capacity structure will be mean to weigh, with students of different numbers differing in percentage, as is shown in the table below.

**Table 4**  
**Quality and Capacity Marking**

	Positive(1)		Neutral(0)		Negative(-1)	
	Number of students	%	Number of students	%	Number of students	%
Knowledge structure	83	46	71	39	27	14
Financial analysis & innovation	92	51	52	29	36	19
Empirical investigation of finance	40	21	81	45	60	33
Integration of relevant knowledge	24	12	83	46	74	41
Comprehensive capacity	22	11	54	30	105	58
Transaction and application	45	24	62	33	74	41
IT application	58	31	72	40	51	28
English learning and communication	69	38	62	33	51	26
Basic quality	67	37	72	40	42	23

According to results of capacity measurement, single capacity of students enrolled in 2006 will be measured in the table below.

**Table 5**  
**Capacity Measurement**

Capacity index	Measurement results
Knowledge structure	5
Financial analysis & innovation	13
Empirical investigation of finance	-13
Integration of relevant knowledge	-5
Comprehensive capacity	-12
Transaction and application	-19
IT application	-6
English learning and communication	1
Basic quality	5

As is revealed from Table 5, the graduates have deficient organizational capacity and leadership, teamwork, cooperative capacity, innovation; they have relatively good basic quality and basic professional working capacity; they still have a long way to go to improve their capacity of internationalization and information technology.

## 2.2 Comprehensive Measure of Graduates' Quality and Capacity

According to the single capacity measurement and the weight of total capacity measurement in relation to each single capacity in the previous tables, Table 6 is shown below:

**Table 6**  
**Measurement and Weight of Single Capacity**

Capacity index	Measurement results	Weight
Knowledge Structure	5	0.25
Financial Analysis & innovation	13	0.0417
Empirical Investigation of Finance	-13	0.0417
Integration of relevant knowledge	-5	0.0208
Comprehensive capacity	-12	0.0208
Transaction and application	-19	0.0417
IT application	-6	0.0417
English learning and communication	1	0.0417
Basic quality	5	0.5

It is convenient to compare the improvement extent of students' quality and capacity of the measurements so as to measure the effect of teaching mode reform.

"Structural surplus" mainly results from the differences between educational objectives of colleges and universities and social requirements, making it impossible for graduates to link with the enterprises. Therefore, defining capacity requirements of enterprises for application-oriented talents in financial engineering, understanding the composition of influential factors, establishing scientific and quantitative index system for evaluation will provide orientation and evaluation criteria for educational reform.

On the whole, the talent ability and quality evaluation system use the method of chromatography to analyze the relative position of each index relative to the comprehensive ability, by which it is easy to grasp the situation of different ability. At the same time, we can judge the practical effect of the reform and teaching mode by using the standard value of individual ability and



comprehensive ability. But the ability and the quality are scaled by 3 hierarchies, according to the relevant data, 5 hierarchies will reduce reliability loss to 12%, and 7-10 scale can make a substantial increase of reliability, which can be regarded as no loss of reliability, but too much questionnaire items can make respondent fatigue, anxiety, decreased attention, Questionnaire are scaled by 3 hierarchies, so reliability and validity will be some loss. And the study and practice of the participants are limited to the teaching staff, there is no the teachers in the students office the study, which is lack of advice how to cultivate students' ability through extracurricular activities naturally. This is also the future research to be solved.

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